



2012 Minerals Yearbook

PORTUGAL

THE MINERAL INDUSTRY OF PORTUGAL

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In 2012, Portugal produced such mineral commodities as lithium (was the fifth-ranked producer after Australia, Chile, China, and Argentina) and tungsten (fifth after China, Russia, Canada, and Bolivia), as well as copper, feldspar, gypsum, kaolin, salt, silver, and talc (table 1; Jaskula, 2013; Shedd, 2013).

Portugal's real gross domestic product (GDP) was \$251 billion in 2012 compared with revised \$259 billion in 2011. The Portuguese economy had started to come out of the recession of 2008 and 2009, growing by 1.9% in 2010, but the country's GDP again decreased in 2011 (by 1.3%) and in 2012 (by 3.2%) owing to the continued economic crisis in the euro area. Portugal's economy was expected to recover gradually during 2014 through 2017, however, driven primarily by increased exports of goods and services. The sectors that contributed to the country's GDP were services (76.3%), industry (21.3%), and agriculture (2.4%). In 2012, unemployment increased to 15.7% from 12.7% in 2011 (Federation of International Trade Associations, The, 2013; Instituto Nacional de Estatística, 2013; International Monetary Fund, 2013, p. 48, 150; U.S. Central Intelligence Agency, 2013).

Minerals in the National Economy

In 2012, Portugal was one of the European Union's (EU's) leading producers of, in order of amount produced, rock salt, gypsum, kaolin, copper, zinc, tungsten, and silver. A number of gold and base-metal projects were undergoing feasibility studies; most of the activity was focused on the Portuguese zone of the Iberian Pyrite Belt (IPB). The IPB measures 60 kilometers (km) wide by 250 km long and extends from the southwestern coast of Portugal near Setúbal to the Guadalquivir River near Seville, Spain. Portugal's mining and minerals activities are controlled by the Instituto Geológico e Mineiro (IGM) (Direcção Geral de Energia e Geologia, 2013; MBendi Information Services (Pty) Ltd., 2013a, b, d, e).

Portugal's mining and mineral processing industries represented about 1% of the GDP in 2012. The mineral sector employed about 32,970, or 0.6% of the labor force total of 5.495 million. Portugal's most valuable metallic mineral resources were copper, silver, tin, tungsten, and zinc. The most valuable resources of industrial minerals besides marble were lithium, pyrites, and rock salt. The country had limited energy resources and depended upon imports to supply the bulk of its energy needs (Direcção Geral de Energia e Geologia, 2013; Instituto Nacional de Estatística, 2013; MBendi Information Services (Pty) Ltd., 2013a, d, e; U.S. Central Intelligence Agency, 2013; U.S. Energy Information Administration, 2013).

Production

Portugal's industrial minerals sector was a producer of a variety of materials, including, in order of the amount produced, limestone, granite, sand, and diorite; the dimension stone and

rock salt sectors continued to be important segments of the mineral industry in terms of value and trade. Portugal was one of the leading producers of mined copper, silver, tungsten, and zinc concentrates in the EU and a significant producer of gypsum, kaolin, and lime (table 1; Direcção Geral de Energia e Geologia, 2013; Instituto Nacional de Estatística, 2013).

Structure of the Mineral Industry

Lundin Mining Corp. (Lundin) of Canada owned the Neves-Corvo copper-zinc underground mine, which is located 100 km north of Faro, Portugal, in the western area of the IPB. A study looking at development of the Lombador copper-lead-zinc deposit as well as the Semblana copper deposit was well advanced. Sojitz Beralt Tin & Wolfram (Portugal) SA continued to mine tungsten at its Panasqueira Mine, which is located in Beira Baixa Province in the east-central region of Portugal (Lundin Mining Corp., 2013a, b; MBendi Information Services (Pty) Ltd., 2013d).

Lusosider Aços Planos S.A. and SN Servicos S.A. were Portugal's leading steel producers. Cimentos de Portugal, SGPS, S.A. (CIMPOR) was a regionally significant producer of cement. With the exception of copper, dimension stone, and tungsten, production of other minerals and related materials had only domestic significance. Some of the leading mineral-related companies were partially owned or controlled by the Government, and some operations were privately owned. In 2012, Portugal had only two metallic mines in operation—the Neves-Corvo Mine and the Panasqueira Mine (table 2; Cimentos de Portugal, SGPS, S.A., 2013a, p. 2; Lundin Mining Corp., 2013b; MBendi Information Services (Pty) Ltd., 2013a, d).

Mineral Trade

Portugal's exports amounted to \$58.2 billion in 2012 compared with a revised \$60.1 billion in 2011 and included such products as, in order of value, chemical products, machinery and tools, crude oil products, base metals, and industrial minerals. Portugal's leading export partners were Spain (22.5%), Germany (12.3%), France (11.9%), Angola (6.6%), the United Kingdom (5.3%), and the Netherlands (4.2%), among others. The main export destination was the EU, the 27 members of which received 46.7% of Portugal's exports. Portugal's imports amounted to \$69.5 billion compared with a revised \$77.7 billion in 2011 and included such products as, in order of value, machinery and tools, oil products, chemical products, base metals, and mineral products. Portugal's leading import partners were Spain (31.9%), Germany (11.5%), France (6.6%), Italy (5.3%), the Netherlands (4.9%), Angola (3.2%), and the United Kingdom (3.0%), among others. The main import origination point was the EU; the EU's 27 members supplied 72% of Portugal's imports (Federation of International Trade Associations, The, 2013; Instituto Nacional de Estatística, 2013;

Commodity Review

Metals

Copper, Gold, Lead, and Zinc.—Production from the Neves-Corvo Mine was 74,043 metric tons (t) of copper content in 2012 compared with 79,686 t in 2011. In 2012, the capacity of the Neves-Corvo's copper plant was about 2.5 million metric tons per year (Mt/yr) of ore and 310,320 metric tons per year (t/yr) of copper concentrate. Neves-Corvo produced 30,008 t of zinc content compared with 4,227 t in 2011. Its zinc plant capacity was about 1.0 Mt/yr of ore and 63,500 t/yr of zinc concentrate (table 1; Lundin Mining Corp., 2013a). According to the mine's owner (Lundin), as of June 30, 2013, Neves-Corvo's copper-rich ores amounted to 27.0 million metric tons (Mt) grading 2.9% copper, 0.8% zinc, 0.2% lead, and 37 grams per metric ton (g/t) silver, and the mine's zinc-rich ores amounted to 23.278 Mt grading 7.4% zinc, 1.8% lead, 0.4% copper, and 70 g/t silver (Instituto Nacional de Estatística, 2013; Lundin Mining Corp., 2013a, b; MBendi Information Services (Pty) Ltd., 2013a).

Lundin was engaging in the acquisition, exploration, development, and mining of base-metal deposits worldwide. Lundin held an interest in the Aljustrel project, which is a potential zinc-lead-silver mine located in the IPB area in southern Portugal, which is known to host numerous multimillion-ton base-metal deposits. The Aljustrel project hosts five known volcanogenic massive sulfide (VMS) deposits; the VMS deposits are a significant source of copper and zinc. The Aljustrel project's final feasibility study estimated total reserves to be 13.8 Mt at average grades of 5.5% zinc, 1.8% lead, and 63 g/t silver (Bloomberg Businessweek, 2013; Direcção Geral de Energia e Geologia, 2013; MBendi Information Services (Pty) Ltd., 2013e).

Tungsten.—Sojitz Beralt Tin & Wolfram's Panasqueira tungsten mine was one of the EU's leading producers of tungsten concentrates. Production from the Panasqueira Mine was 763 t in concentrate (W content) in 2012 compared with a revised 819 t in 2011. The Panasqueira Mine had the capacity to produce 1,000 t/yr of tungsten in concentrate. According to Beralt, the mine had proven and probable reserves of 1.4 Mt grading 0.233% WO_3 , additional indicated resources of 3.3 Mt grading 0.263% WO_3 , and inferred resources of 1.6 Mt grading 0.224% WO_3 . The main end-use application for tungsten was in the manufacture of cemented carbides (60%), steel and alloys (20%), electrical and electronics products (12%), and catalysts and pigments (8%). Despite lower tungsten prices on the world market, production was continuing at the mine because it was producing concentrate on a long-term contract basis. The planned expansion of the facility was postponed because of the decrease in the tungsten market price, however (table 1; Direcção Geral de Energia e Geologia, 2013; MBendi Information Services (Pty) Ltd., 2013b, d).

Industrial Minerals

Cement.—In 2012, Portugal produced about the same estimated amount of cement as in 2011 (7.2 Mt). CIMPOR continued to be Portugal's leading cement producer and the second-ranked cement producer on the Iberian Peninsula after Cemex España S.A. In addition to cement, CIMPOR also produced aggregates, dry mortars, and precast concrete products. In line with the world economy, 2012 was a year of transition for Portugal's cement industry, and its domestic cement sales decreased to 3.4 Mt in 2012 from 3.7 Mt in 2011. The development of Portugal's infrastructure was expected to increase the demand for CIMPOR's products in the foreseeable future to a potential output of 9 Mt/yr (table 1; Cimentos de Portugal, SGPS, S.A., 2013a, p. 6–7; 2013b, p. 2).

Salt.—Rock salt was the leading industrial mineral produced in Portugal. The production of rock salt totaled 520,284 t in 2012 compared with 631,295 t in 2011 (table 1; Direcção Geral de Energia e Geologia, 2013).

Mineral Fuels and Other Sources of Energy

Petroleum, Natural Gas, and Coal.—In 2012, Portugal continued to rely on imported energy resources, such as petroleum imports of about 230,000 barrels per day (bbl/d), natural gas (5.2 billion cubic meters per year), and coal (3.6 Mt/yr). The country's leading domestic energy resource was hydropower, which is an unreliable source of power because it depends on rainfall. The Portugal Government had two crude oil refineries, which were located in the coastal cities of Porto and Sines. Argus Resources Ltd. of the United Kingdom built the petroleum refinery at Sines, which is located 90 km south of Lisbon; the refinery had a production capacity of 250,000 bbl/d and cost about \$5 billion to build. Government-owned Petróleos de Portugal (Petrogal) operated the Porto and the Sines refineries, which had a combined capacity of 305,000 bbl/d. Petrogal was planning to invest about \$2 billion to upgrade the country's refining processes during 2013 to 2014. The political and legal issues surrounding the EU-Russia energy relationship continued to be under review owing to concerns about the reliability of the energy supply from Russia. Production data for mineral fuels and refined products are shown in table 1 (MBendi Information Services (Pty) Ltd., 2013c; U.S. Energy Information Administration, 2013).

Renewable Energy.—Owing to Portugal's high dependence on imported energy sources, the country was emphasizing solar, wave, and wind power investment. Portugal was planning to invest about \$11 billion in renewable energy projects in the near future, of which \$2.5 billion would be for building the infrastructure for wind power. The financial crisis and the economic distress in many EU countries, however, were expected to have a negative effect on the wind power industry, and the increasing scarcity of finance could be a challenge to decreasing Portugal's dependence on mineral fuel imports. In 2012, the wind power production capacity in Portugal increased to 4,525 megawatts (MW) from a revised 4,379 MW in 2011, or by about 3.3%. In 2012, the wind power production capacity of the EU-27 countries amounted to 106,040 MW. The

leading European countries with wind power installations were Germany (31,308 MW) and Spain (22,796 MW) followed by the United Kingdom (8,445 MW), Italy (8,144 MW), France (7,564 MW), Portugal (4,525 MW), Denmark (4,162 MW), Sweden (3,745 MW), and Poland (2,497 MW) (BP p.l.c., 2013, p. 39; European Wind Energy Association, The, 2013, p. 4–5; U.S. Energy Information Administration, 2013).

Outlook

Portugal continues to be the EU's principal producer of copper, gypsum, lithium, kaolin, rock salt, and tungsten. The structure of the Portuguese mineral industry could change in the near future, however, owing to significant mineral exploration being conducted by several foreign companies, particularly for base and precious metals, kaolin, pyrites, and tin. Feasibility studies for potential precious and base-metal projects were underway in the Portuguese zone of the IPB, which was the prime area for exploration activity. Owing in part to the financial crisis and the economic distress in many EU countries, Portugal is considering increasing investments in alternative energy sources, such as hydropower, solar, wave, wind, and other renewable energy sources to make the country less dependent on imported energy. The Government is also considering making improvements in the efficiency and performance of alternative energy sources by introducing new technologies. If the financial crisis in the EU improves, then Portugal's dependence on fuel mineral imports could be decreased in the medium term (MBendi Information Services (Pty) Ltd., 2013d, e; European Wind Energy Association, The, 2013, p. 5, 11, 13).

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TABLE 1
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2008	2009	2010	2011	2012 ^P
METALS					
Aluminum, secondary ^c thousand metric tons	18	18	18	18	18
Arsenic, white ^c	15	15	15	15	15
Beryl, concentrate, gross weight ^c	5	5	5	5	5
Copper, mine output, Cu content	89,504	86,500	74,426	79,686	74,043
Iron and steel:					
Iron ore and concentrate, manganiferous: ^c					
Gross weight	14,000	14,000	14,000	14,000	14,000
Fe content	10,000	10,000	10,000	10,000	10,000
Metal: ^c					
Pig iron thousand metric tons	100	100	100	100	100
Steel:					
Crude do.	1,630 ³	1,587 ³	1,351 ³	1,400	1,400
Hot-rolled do.	800	800	800	800	800
Lead, refined, secondary ^c	3,000	3,000	3,000	3,000	3,000
Manganese, Mn content of iron ore ^c	300	300	300	300	300
Silver, mine output, Ag content kilograms	28,800	22,450	23,710	28,380	27,244
Tin, mine output, Sn content	29	34	22	39	42
Tungsten mine output, W content	982	823	799 ^r	819	763
Zinc, mine output, Zn content	39,224	501	6,421	4,227	30,008
INDUSTRIAL MINERALS					
Barite	171	1,078	15	--	--
Calcium carbonate ^c	100,000	100,000	100,000	100,000	100,000
Cement, hydraulic thousand metric tons	6,650	6,900	7,200 ⁴	7,200 ⁴	7,200
Clays, kaolin ⁵	231,346	274,925	273,890	322,091 ^r	317,489
Feldspar	157,539	157,476 ^r	121,827	114,600 ^r	109,273
Gypsum and anhydrite	372,731	335,189	336,755	337,272	321,988
Lime, hydrated and quicklime ^c	100,000 ^r	70,000 ^r	60,000 ^r	60,000 ^r	60,000
Lithium minerals, pegmatite (1.5% Li)	34,888	37,359	40,109	37,534	20,698
Nitrogen, N content of ammonia ^c	244,000	244,000	244,000	244,000	244,000
Pyrite and pyrrhotite, including cuprous, gross weight ^c	8,000	8,000	8,000	8,000	8,000
Salt, rock	606,545	594,578	618,961	631,295	520,284
Sand thousand metric tons	NA	9,585	7,933	7,209 ^r	NA
Sodium compounds, n.e.s.: ^{5,6}					
Soda ash	150,000	150,000	150,000	150,000	150,000
Sulfate	50,000	50,000	50,000	50,000	50,000
Stone:					
Basalt	NA	326,730	240,150	361,414 ^r	NA
Calcareous:					
Dolomite thousand metric tons	NA	144	257	195 ^r	NA
Limestone, marl, calcite do.	NA	43,277	33,756	30,477 ^r	NA
Marble do.	578	572	94	125 ^r	NA
Gabbro do.	100	100	693	94 ^r	NA
Granite, ornamental do.	877	934	21,436	21,758 ^r	NA
Graywacke do.	NA	NA	NA	526 ^r	NA
Quartz do.	9	35	31	29	38
Quartzite do.	NA	NA	45	53 ^r	NA
Schist do.	NA	679	83	70 ^r	NA
Slate do.	38	20	NA	NA	NA
Sulfur, byproduct, all sources ^c	25,000	25,000	25,000	25,000	25,000
Talc	11,220	11,567	11,981	15,462	15,131
MINERAL FUELS AND RELATED MATERIALS					
Coke, metallurgical ^c thousand metric tons	300	300	300	300	300
Gas, manufactured ^c thousand cubic meters	125	125	125	125	125
Petroleum ⁷ thousand 42-gallon barrels	2,730	1,728	1,723	1,725	1,730 ^c

See footnotes at end of table.

TABLE 1—Continued
 PORTUGAL: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2008	2009	2010	2011	2012 ^p	
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum refinery products:^c						
Liquefied petroleum gas	thousand 42-gallon barrels	4,444 ⁸	4,450	4,450	4,450	4,450
Gasoline	do.	17,805 ⁸	18,000	18,000	18,000	18,000
Kerosene and jet fuel	do.	6,508 ⁸	6,500	6,500	6,500	6,500
Distillate fuel oil	do.	34,846 ⁸	35,000	35,000	35,000	35,000
Residual fuel oil	do.	19,099 ⁸	19,000	19,000	19,000	19,000
Unspecified	do.	15,709 ⁸	16,000	16,000	16,000	16,000
Refinery fuel and losses	do.	3,800	3,800	3,800	3,800	3,800
Total	do.	102,211 ⁸	103,000	103,000	103,000	103,000

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^pPreliminary. ^rRevised. do. Ditto.
 NA Not available. -- Zero.

¹Table includes data available through August 21, 2013.

²In addition to the commodities listed, Portugal produced refractory clay, crushed granite, ophite, and syenite, but information is inadequate to make reliable estimates of output.

³Reported by Worldsteel Association 2011 and 2012.

⁴Reported by Cimentos de Portugal, SGPS, S.A. (CIMPOR).

⁵Includes washed and unwashed kaolin.

⁶Not elsewhere specified.

⁷Reported figure. Source: U.S. Energy Information Administration, 2008 through 2012.

⁸Reported figure.

Source: USGS Minerals Questionnaires, Portugal, 2010 through 2012.

TABLE 2
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Calcium carbonate		Omya Mineral Portuguesa Lda. (Salmon & Cia Lda.)	Mine and plant at Fatima	100
Cement		Cimentos de Portugal, SGPS, S.A. (CIMPOR) (Government, 100%)	Plants (3) at Alhandra, Loule, and Souselas	12,000
Copper, concentrate		Lundin Mining Corp.	Neves-Corvo Mine near Castro Verde	300
Do.		do.	Lombador Mine near Castro Verde	20
Diatomite		Sociedade Anglo-Portuguesa de Diatomite Lda.	Mines at Obidos and Rolica	150
Feldspar		A.J. da Fonseca Lda.	Seixigal Quarry, Chaves	10
Ferroalloys		Electrometalúrgia S.A.R.L.	Plant at Setubal	100
Kaolin		Saibraís Arelas e Caulinos S.A. (Denain Anzin Mineraux S.A.)	Mines at Casal dos Bracais and Mosteiros	175
Petroleum, refined	42-gallon barrels per day	Petróleos de Portugal (Petrogal) (Government, 100%)	Refineries at Porto and Sines	305,000
Do.	do.	Argus Resources Ltd. (private 100%)	Refinery at Sines	250,000
Pyrite		Pirites Alentejanas S.A. (EuroZinc Mining Corp.)	Mine at Aljustrel, plant at Setubal	100
Steel, crude		SN Servicos S.A. (Metalúrgica Galaica S.A., 100%)	Steelworks at Maia and Seixal	600
Do.		Lusosider Aços Planos S.A. (Corus Group, 50%, and Sollac S.A., 50%)	Rolling mill at Seixal	800
Tin		Sojitz Beralt Tin & Wolfram (Portugal) SA	Panasqueira Mine and plant at Barroca	42
Tungsten, concentrate	metric tons	do.	do.	1,000
Uranium	do.	Empresa Nacional de Uranio S.A. (Government, 100%)	Mines at Guargia, plant at Urgeirica	150
Zinc, concentrate	do.	Lundin Mining Corp.	Neves-Corvo Mine near Castro Verde	150,000
Do.	do.	do.	Lombador Mine near Castro Verde	NA
Zinc, refined	do.	RMC Quimigal S.A.R.L.	Electrolytic plant at Barreiro	12

Do., do. Ditto. NA Not available.